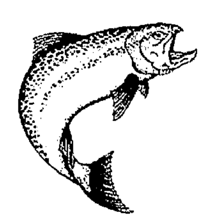
10. TURBIDITY AND SEDIMENTATION

10. TURBIDITY AND SEDIMENTATION 10-1
10.1 SUMMARY 10-1
10.2 PROBLEM STATEMENT 10-1
10.3 OBJECTIVE 10-1
10.4 PROBLEM DESCRIPTION 10-2
10.4.1 Bay Region 10-2
10.4.2 San Joaquin River Region 10-2
10.5 APPROACH TO SOLUTION 10-4
10.5.1 Priority Actions 10-4
10.5.2 Information Needed 10-6



10. TURBIDITY AND SEDIMENTATION

10.1 SUMMARY

Sedimentation has been linked with declining habitat in upper watershed streams.

Sedimentation has been linked with declining habitat in upper watershed streams. Impairment of habitat by sedimentation could cause long-term declines in certain species of fish. This section identifies existing and potential turbidity- and sedimentation-related problems; scientific and other technical information needs such as monitoring, research and modeling, and targets and performance measures; and management actions to reduce, eliminate, or prevent ecological impacts associated with these parameters. Turbidity and sedimentation environmental water quality issues are covered in two regions: the Bay and San Joaquin River Regions. Drinking water and pesticides concerns associated with these parameters in the CALFED geographic regions are addressed in other sections of the Water Quality Program Plan. High turbidity and sedimentation are not ecological water quality concerns in the Delta. Water-column turbidity decreased and water clarity (secchi disk depth) increased in the Delta from 1970 to 1993. Turbidity and sedimentation in the Sacramento River watershed typically has little nexus to the Bay-Delta but may be of local ecological significance. Turbidity and sedimentation also are not issues for the Other SWP and CVP Service Areas.

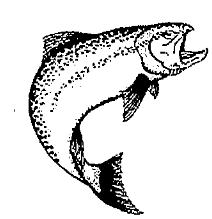
10.2 PROBLEM STATEMENT

Excessive high turbidity and sedimentation resulting from anthropogenic sediment loading have been previously identified as water quality concerns affecting (or potentially affecting) environmental and drinking water beneficial uses.

Turbidity and sedimentation affect spawning habitat of some fish species, estuarine and fresh-water benthic habitat and organisms, treatment of drinking water, productivity in estuarine waters, and aesthetics. Excessive high turbidity and sedimentation resulting from anthropogenic sediment loading have been previously identified as water quality concerns affecting (or potentially affecting) environmental and drinking water beneficial uses.

10.3 OBJECTIVE

The objective is to reduce sediment in areas to the degree that sediment does not cause negative impacts on beneficial uses of the surface water, including ecosystem benefits and municipal uses. (Please note: A balance exists between the amount of sediment needed in Delta water and an amount that is harmful to the ecosystem and troublesome for drinking water treatment.)



10.4 PROBLEM DESCRIPTION

Individual regions discussed below have been identified by responsible RWQCBs as containing water bodies that are, or have been, impaired by turbidity and sedimentation. Much of the problem details for these individual sites are still unknown. Additional problem characterization and solution studies need to be performed.

10.4.1 Bay Region

High turbidity is not an ecological water quality concern in central and south San Francisco Bay, San Pablo Bay, or Suisun Bay. Turbidity can limit phytoplankton production in San Francisco Bay; however, high turbidity is a natural attribute of this estuary, and thus not a water quality concern in this area. Turbidity levels in Suisun Bay decreased from 1970 to 1993. Turbidity and water clarity (secchi disk depth) levels in San Pablo changed little from 1970 to 1993.

Sediment supply to the San Francisco Bay from the Sacramento and San Joaquin River watersheds has declined over recent years due to dams on rivers and other water management actions, resulting in less sediment available to build and maintain mud flats. This, in turn, increases wave energy on marshes, causing them to erode. This issue is more fully addressed by the CALFED Ecosystem Restoration Program Plan.

Sediment supply to the San Francisco Bay from the Sacramento and San Joaquin River watersheds has declined over recent years due to dams on rivers and other water management actions, resulting in less sediment available to build and maintain mud flats.

Napa River, Petaluma River, and Sonoma Creek

Turbidity is a water quality concern in the Napa River, Petaluma River, and Sonoma Creek—all tributaries to San Pablo Bay and included on the CWA Section 303(d) list as impaired water bodies. Agricultural and urban runoff are the sources of the turbidity water quality problems in these water bodies.

10.4.2 San Joaquin River Region

The Tuolumne River experiences fine-sediment (fine bed material) loading primarily from agricultural land use practices and in-channel mining activities.

Tuolumne River

The Tuolumne River experiences fine-sediment (fine bed material) loading primarily from agricultural land use practices and in-channel mining activities. The major sources of fine sediments are typically tributary stream channels and large gullies. Non-point sources are usually erosion from agricultural lands.

Gasburg Creek, lower Dominici Creek, and Pealsee Creek are major producers of fine sediment. Much of the sediments transported by Gasburg Creek originates from runoff from a sand extraction operation. Anthropogenic fine-sediment loading adversely affects the quality and quantity of spawning and rearing habitat for salmonids and other fishes. Pore space in the gravel stream beds is filled in, which reduces egg survival. Macroinvertebrate production also may be affected. Sediment loading to Gasburg Creek results in the greatest potential impacts on salmon habitat. Reducing fine-sediment loads to the river from anthropogenic sources, particularly near LaGrange, will improve fish spawning and rearing habitat quality and extent, and increase the longevity of efforts to improve gravel quality.

Merced and Stanislaus Rivers

The Merced and Stanislaus Rivers also experience fine-sediment loading from anthropogenic sources, including adjacent and upslope agricultural land use practices and in-channel mining activities. Sedimentation has affected the quality and quantity of rearing and spawning habitat for salmonids and other fishes in the Merced and Stanislaus Rivers. Pore space in the gravel stream beds is filled in, which reduces egg survival. Macroinvertebrate production also may be affected. Although few streams are tributary to these rivers below the dams, the existing tributaries often contribute large fine-sediment loads to the lower sections of these rivers. The Technical Watershed Groups for each of these rivers are developing river corridor assessments and management strategies for water quality and other ecological problems (similar to the Tuolumne River Corridor Restoration Plan).

Sedimentation has affected the quality and quantity of rearing and spawning habitat for salmonids and other fishes in the Merced and Stanislaus Rivers.

Cosumnes River

The Cosumnes River receives large loads of fine sediment from soil erosion in the upper watershed related to forestry activities (timber harvest and road building). This sediment loading and resulting sedimentation adversely affects fish spawning habitat and likely causes other water quality problems. These effects have largely been qualitatively assessed, however, and have not been quantified. The USFS is conducting an upper watershed sediment source survey and impact assessment.

The Cosumnes River receives large loads of fine sediment from soil erosion in the upper watershed related to forestry activities (timber harvest and road building).

10.5 APPROACH TO SOLUTION

10.5.1 Priority Actions

Bay Region

1. Implement erosion control BMPs on urban construction and BMPs for agricultural lands to reduce sediment in the Napa River, Petaluma River, and Sonoma Creek.

San Joaquin River Region

Tuolumne River

1. Evaluate constructing a sedimentation pond near the mouth of Gasburg Creek. This action would prevent nearly all harmful fine sediments from entering the Tuolumne River.

2. Evaluate constructing a head control structure on lower Dominici Creek.

3. Develop and implement land use BMPs, particularly along tributary watercourses, to reduce soil erosion and fine-sediment inputs.

4. Manage floodplains to help diminish the negative impact of fine-sediment loads from anthropogenic sources by facilitating natural deposition on floodplain surfaces.

5. Mechanically remove fine sediments to reduce fine-sediment storage in the bankfull channel, including excavating sand stored in pools, excavating sand from riparian berms and backwaters, and mechanically flushing and removing sand from riffles (to be accomplished through the CALFED Ecosystem Restoration Program as habitat restoration actions).

Constructing a sedimentation pond near the mouth of Gasburg Creek would prevent nearly all harmful fine sediments from entering the Tuolumne River.

Targets and Performance Measures: Tuolumne River

Reduce fine-sediment loads to the Tuolumne River from anthropogenic sources, particularly near LaGrange, and reduce sedimentation in the river. Measure sediment loads to the river and the suspended sediment content and sedimentation rate in the river.

Reduce fine-sediment storage in the bankfull channel. Measure fine-sediment storage in the Tuolumne River.

Reduce or eliminate any ecological impacts in the Tuolumne River due to fine-sediment loading and sedimentation from anthropogenic sources. Measure sediment loads to the river and suspended sediment content, sedimentation rate, and fine-sediment storage in the river. Perform appropriate biological surveys in the river through the CALFED Ecosystem Restoration Program, in coordination with the Water Quality Program.

In addition, the USFS study may recommend management actions.

Merced and Stanislaus Rivers

1. Quantitatively determine Merced and Stanislaus River sediment loads, budgets, and sources.

2. Perform quantitative ecological assessments of the effects of sedimentation on the Merced and Stanislaus Rivers through the CALFED Ecosystem Restoration Program, in coordination with the Water Quality Program.

3. Develop a Technical Watershed Group for each river and address corrective actions.

Targets and Performance Measures: Merced and Stanislaus Rivers

Reduce fine-sediment loads from anthropogenic sources and reduce sedimentation in the Merced and Stanislaus Rivers. Measure sediment loads, suspended sediment content, and sedimentation rate in the rivers.

Reduce fine-sediment storage in the bankfull channel. Measure fine-sediment storage in the Merced and Stanislaus Rivers.

Reduce or eliminate ecological impacts in the Merced and Stanislaus Rivers due to fine-sediment loading and sedimentation from anthropogenic sources. Measure sediment loads, suspended sediment content, sedimentation rate, and fine-sediment storage in the Merced and Stanislaus Rivers. Perform appropriate biological surveys in the rivers through the CALFED Ecosystem Restoration Program, in coordination with the Water Quality Program.

10.5.2 Information Needed

Tuolumne River

The following scientific needs are specific to sediment loading in the Tuolumne River corridor:

- Document fine-sediment bedload transport rates as a function of hydrology, combining monitoring and modeling.
- Document changes in fine-sediment in-stream storage.
- Monitor fine-sediment loads to the river, suspended sediment concentrations, and turbidity as part of a river-wide monitoring and adaptive management program.

Cosumnes River

The following scientific needs are specific to sediment loading in the Cosumnes River watershed:

- Quantitatively determine Cosumnes River sediment loads, budget, and sources. The USFS study may meet this need.